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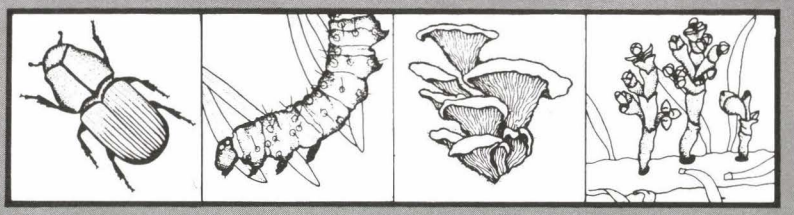

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MATING DISRUPTION FOR TIP MOTH CONTROL AT THE LENORE TREE IMPROVEMENT AREA Clearwater National Forest, Idaho February - March 1994

by

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INTRODUCTION

The ponderosa pine tip moth, *Rhyacionia zozana* (Kearfott) has been a problem at the Lenore Tree Improvement Area (TIA) since 1991. The Lenore TIA, located on the Clearwater River about 15 miles west of Orofino, Idaho, contains 13,000 ponderosa pine trees on about 3.5 acres. The trees were planted as 1-year-old stock in 1991 and are now about 3-4 feet tall. The TIA is an early selection growth trial where the policy is to control all insects and diseases that affect growth. Tip moths cause damage by mining the buds and shoots of young pines. Tree growth is retarded and trees are deformed.

The TIA was sprayed with carbaryl to control tip moths in 1993 (Kegley et al. 1994). In 1994, we tried a pheromone mating disruption technique based on previous work by Niwa and others in Oregon (Niwa et al. 1988). This is a report of our 1994 efforts.

METHODS

A commercial product for mating disruption of *R. zozana* is not currently available. We obtained the pheromone, a 95:5 mixture of E-9-dodecenyl acetate and E-9-dodecenol, from the Bedoukian Chemical Company in Conneticut. Hercon Environmental Company, in Pennsylvannia, impregnated the pheromone into one-fourth inch wide laminate tape releasers. The total cost for the chemical and laminate releasers was about $1,800. This was the minimum amount the two companies would process and provide 4 years' worth of pheromone releasers for the 3.5 acre TIA at an annual cost of $450.

The impregnated laminate tape had to be cut into 20-inch length releasers to provide a recommended 15 g. per hectare dosage (Dr. Chris Niwa,personal communication). On February 22, 1994, 156 releasers were placed 10 meters apart in the TIA. The

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releasers were manually applied by tying the laminate tape to tree branches close to the terminal shoot. In addition, 20 extra releasers were placed on the north and south borders of the TIA to determine pheromone release rate throughout the test period. Four of these 20 were collected at approximately 2-week intervals until April 13. After collection, they were immediately placed in the freezer to be analyzed later by the Pacific Northwest Research Station for residual pheromone. Four releasers were placed in the freezer on February 22 to serve as controls.

In addition to the pheromone releasers, 10 pheromone-baited sticky traps were placed throughout the TIA at least 1 chain apart. Because of the high value of the individual trees, and the lack of a sufficient number of other ponderosa pine seedlings in the area, the entire TIA was treated and no trees were available as controls. Treatment efficacy was assessed by reduction in damage from the 1992 pre-spray and 1993 post-spray survey data, and by the response of the male moths to pheromone-baited traps.

A total of 1,617 trees (12.4 percent of the TIA) were examined for damage to the terminal and lateral buds in July 1994 when damage was evident. Tree family number and tree location was recorded. The sample included about nine trees in each family.

RESULTS

The mating disruption treatment was almost totally effective in preventing male moths from locating pheromone-baited sticky traps. Only one male was caught in 10 traps. This is a good indication that the sex pheromone communication between males and females was disrupted. For comparison, 82 moths were caught over the flight period in 1993.

The pheromone releasers, for determining release rate, were removed from the field 2, 4, 6, 9, and 11.5 weeks after treatment. Average percent pheromone remaining in the releasers are shown in Table 1. The goal was to get most of the pheromone out during the flight period and not to have it released too quickly nor have too much remaining afterwards. The flight period of *R. zozana* in 1993 occurred from March 10 - April 21. Assuming a similar flight period for 1994, the pheromone was released at the appropriate time.

Table 1--Average percent pheromone remaining in releasers over time.

Date	Weeks	% Pheromone Remaining
February 22	Control	100
March 8	2	89
March 21	4	54
April 4	6	43
April 26	9	26
May 13	11.5	14

In the 1994 damage survey, only one terminal and 42 lateral buds were infested. Comparing these results with previous years and different treatments, shows a substantial decrease in damage (Table 2). The differences in terminal buds damaged are significant ($p < .05$) between all treatments. The differences in lateral buds damaged are significant between 1994 and 1992 and 1994 and 1993 ($p < .01$), but not between 1992 and 1993 (Confidence limits for a proportion, Snedecor and Cochran 1967).

Table 2--Tip moth damage estimates by year and treatment.

Year	Treatmt.	Terminals Infested Number	Percent	# Laterals Infested
1991	None	111	6.8	164
1993	Carbaryl	23	1.4	148
1994	Mating Disruption	1	0.06	42

DISCUSSION

Control of *R. zozana* by mating disruption has been very effective in Oregon, reducing larval populations by 83.2 percent in treated areas (Niwa et al. 1988). Although we had no control plots to compare with our data at Lenore, the trap catch and damage reduction from previous years provide convincing evidence of effective treatment. The treatment is environmentally safe, easy to apply and provides for minimal worker contact with the active ingredients. Mating disruption treatment is about half the cost of spraying carbaryl (Table 3), with a much reduced risk of worker exposure to the chemical insecticide or the pheromone.

Table 3--Cost comparison between carbaryl treatment in 1993 and mating disruption in 1994.

	Carbaryl	Mating Disruption
Material	30	450
Labor	1,050	75
TOTAL	1,080	$525

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